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SOIL TRANSPORT AND FATE DATABASE 2.0

AND

MODEL MANAGEMENT SYSTEM

by

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INTRODUCTION TO THE SOIL TRANSPORT AND FATE DATABASE 2.0 AND MODEL MANAGEMENT SYSTEM

Version 1.0 of the Soil Transport and Fate Database (STF) was released in October 1988. This update of the Database (Version 2.0) incorporates recent research findings as well as modifications and changes suggested by users and the U.S. EPA Project Officer.

DESCRIPTION OF SOIL TRANSPORT AND FATE DATABASE 2.0 AND MODEL MANAGEMENT SYSTEM

The Soil Transport and Fate Database 2.0 and Model Management System (referred to as the "System") consists of three categories. The first category contains the Soil Transport and Fate Database 2.0 (STF 2.0). The second category contains the VIP model editor (VME) and the RITZ model editor (RME). These editors interface directly with STF 2.0. The third category contains the VIP and RITZ models and are included for convenience.

Minimal instructions on the use of the VIP and RITZ models as part of the System are presented in this manual. Please refer directly to the respective user's manuals (Nofziger et al., 1988; Stevens et al., 1988; Stevens et al., 1989) for in depth inquiries as to the theory or applications of the VIP and RITZ models.

The System is automatically entered the first time as part of the installation process. Thereafter, The System is entered by typing STF at the root directory prompt (typically C:\). Upon typing STF, the User is presented with the System menu, from which the desired application is chosen.

Instruction for use of the System is divided into two parts. Part I covers the STF 2.0 and Part II covers the VME and RME interface programs.

PART I

DESCRIPTION OF SOIL TRANSPORT AND FATE DATABASE 2.0

The Soil Transport and Fate (STF 2.0) Database 2.0 provides quantitative and qualitative information concerning the behavior of organic and a few inorganic chemicals (comprised of the Appendix VIII constituents listed in 40 CFR Part 261) in soil environments. The chemicals have been characterized for soil chemical processes using literature data. Soil chemical processes characterized include:

* Degradation;

* Transformation;

* Partitioning among the water, soil, air, and oil phases comprising a soil system;

* Toxicity; and

* Propensity to bioaccumulate.

Additional information in the STF 2.0 Database includes chemical properties data and literature citations. The User therefore can access the source of data or information found in STF 2.0. A list of journals and documents cited in STF 2.0 is provided in Appendix F. In most cases, only data generated since 1980 have been included in data files containing information on chemical properties, toxicity, and bioaccumulation. The major emphasis was to include data generated since 1987 for the fate of chemicals in soil environments.

The STF Database is a tool for EPA personnel involved with contaminated site assessment and remediation activities. The STF Database may be used to provide input data concerning degradation rates, partition coefficients, and chemical property data for mathematical models simulating the behavior and fate of chemical constituents in contaminated surface and subsurface soils, either through the direct extraction of data from STF 2.0 into the VIP and RITZ model editors, or by creating reports for using data in other models or applications. The information is also useful for providing assistance in determining treatment potential at contaminated sites using in situ techniques. Chemicals may be evaluated with respect to the importance of natural processes in controlling persistence and transport potential and therefore the susceptibility to degradation or retardation within a soil or subsurface environment.

STF 2.0 FILES

STF 2.0 is divided into seven separate files. Two of these files, IDENTIFICATION and REFERENCES, are designed to help the User find and/or access data referenced in STF 2.0. Five additional files, CHEMICAL CHARACTERISTICS, IMMOBILIZATION, TRANSFORMATION/ DEGRADATION, TOXICITY and BIOCONCENTRATION, provide specific information for each of the chemicals found in STF 2.0. General information and definitions of the parameters in the STF 2.0 files are explained below:

*** IDENTIFICATION**

This file contains an alphabetical list (included in Appendix D) of the approximately 400 chemicals included in the STF 2.0 Database. From this list, the User selects the chemical for which information is required. The IDENTIFICATION file includes: (1) the STF chemical name, which, in most cases, is the name given in 40 CFR Part 261, Appendix VIII; and identification number (most of which are Chemical Abstract Service (CAS) numbers- if no CAS number was available, a unique STF number was assigned to the chemical in the form 999-00-*, where * ranges from 1-5; and (2) common names for each chemical).

*** CHEMICAL CHARACTERISTICS (also referred to as "Chemicals")**

This file contains information concerning physical and chemical characteristics of the chemicals included in the STF 2.0 Database. For information presented that is not otherwise qualified, the User should assume a standard temperature of 25°C. Additional information about a parameter or important information that does not fit a specific parameter field are included in the memo. The User is strongly advised to always consult the memo. Parameters found in this file are defined below.

Use or Occurrence: The purpose for which the chemical was adopted or where it occurs in the environment.

Formula: The relative number of atoms of each type of element in the chemical; given as the number of carbons followed by the number of hydrogens followed by any other elements in alphabetical order.

Molecular Mass (g/mol): The mass obtained by adding the masses of all the atoms in the molecular formula of a substance.

Vapor Pressure (torr): The pressure exerted by the vapor (gas) of a substance when it is under equilibrium conditions with its own vapor.

Viscosity (g/cm-s): The resistance to change of form (liquid) or gradual yielding to forces tending to change their form (solids); the lower the viscosity, the greater the mobility of the substance.

Specific Gravity (dimensionless): The ratio of the mass of a body to the mass of an equal volume of water at 4 °C or other specified temperature.

Melting Point (°C): The temperature at which a solid substance undergoes a phase change to a liquid.

Boiling Point (°C): The temperature at which the vapor pressure of a liquid equals the atmospheric pressure.

Henry's Law Constant (dimensionless): The ratio of the partial pressure of a compound in air to the concentration of the compound in water at a given temperature under equilibrium conditions; the greater the value for Henry's Law constant, the greater the tendency of the compound to volatilize from aqueous solution.

Diffusivity Coefficient, Air (sq. cm/s): The measure of the rate of diffusion (process by which the substance mixes with air) of a substance in air.

Diffusivity Coefficient, Water (sq. cm/s): The measure of the rate of diffusion (process by which the substance mixes with water) of a substance in water.

Gibb's Free Energy (kcal/mol): The thermodynamic function of state, which is constant during a reversible isobaric - isothermic process (thermodynamic potential); a measure of the spontaneity of a reaction.

Log Octanol-Water (dimensionless): Partition coefficient; ratio of the concentration of the compound in octanol relative to the concentration of the compound in water; a measurement of the extent to which a substance partitions itself between octanol and water. The greater the Kow value of a compound, the smaller will be its tendency to move with the aqueous phase in the subsurface.

Acid Dissociation Constant (pKa):

$$pKa = \frac{-\log [H+][A-]}{HA}$$

where HA is the acid and A- is the conjugate base; the greater the pKa, the weaker the substance as an acid.

Solubility in Water (mg/l): The saturated concentration of the concentration of the compound in water at a given temperature and pressure. Compounds with high water solubilities tend to desorb from soils and sediments and are less likely to volatilize from water (they will tend to migrate further with the aqueous flow component than those with low solubilities).

Detection Limit in Aqueous Medium: The lower limit for accurate measurement that is affected by interfering substances and by the analytical method and instrument.

EPA Guidance Concentration: The suggested EPA quality standard for the compound in air (ug/m^3), water (ug/L), and soil (ug/g).

Analytical Method: The technique for extracting the compound from a given medium. For most chemicals, the analytical method is a recommended EPA test method.

*** IMMOBILIZATION (also referred to as "Immobility")**

This file contains information concerning partitioning, immobility, and transport of the chemicals in a soil environment. Additional information about each chemical is located in either of the two memos for the chemical. The User is strongly advised to consult these memos. Parameters found in this file are defined below.

SOIL TYPE AND CONDITIONS

Soil Name: Soil name is given as the series from the USDA soil classification system. If the series classification name was not given, the soil name was assigned a site location/topography descriptor.

Texture: Relative proportions of the various soil separates (sand, silt, and clay) in a soil as described by the classes of soil texture presented in the United States Department of Agriculture (USDA) "texture triangle."

pH Range: Range of the acidity (or alkalinity) of the soil, where pH is the negative logarithm of the hydrogen ion activity of the soil.

Average Temperature: The mean thermal temperature measurement of the soil or the temperature at which the soil was maintained.

Average Moisture Content: The mean amount of water retained by absorption when water is free to move through a mass of soil.

SOIL PROPERTIES

Permeability (cm/d): The readiness with which a porous medium (the soil) transmits water.

Cation Exchange Capacity (cmol/kg): The measure of the quantity of readily exchangeable cations (positive ions) neutralizing negative charges in the soil; the quantity of cations adsorbed on soil-particle surfaces per unit mass of the soil under chemically neutral conditions.

Organic Carbon (%): The difference between the total carbon (%) and the inorganic carbon (%) in the soil; most organic carbon is contained in the soil organic fraction (cells of microorganisms, plant and animal residues, highly carbonized compounds such as graphite and coal, etc.); inorganic carbon is mostly present in carbonate materials.

Saturated Water Content (fraction): The fraction, by weight or volume, at which the water content is equal to the porosity of the soil.

Saturated Hydraulic Conductivity: The ratio of the flux of water to the hydraulic gradient in saturated soil.

Porosity:

$$\text{Total porosity} = 1 - \frac{\text{bulk density}}{\text{particle density}}$$

Bulk Density (g/cm^3): The ratio of the mass of dry soil to its total volume (solids and pores together). Weight soil/volume soil.

Particle Effective Size (mm): The tenth percentile size (ten percent of particles, by weight, are smaller than the 'particle effective size').

WASTE PROPERTIES

Constituent Concentration (g/m^3): The concentration of a chemical in the medium of concern.

Mass Fraction of Oil: The fraction by weight of oil in a waste.

Mass Fraction of Water: The fraction by weight of water in a waste.

Density of Oil (g/cm^3): The ratio of mass of oil to volume of oil.

Viscosity of Oil (cp): An indication of the ease with which a compound will flow; the lower the viscosity, the greater will be the mobility of the compound.

Log K_o: oil/water partition coefficient;

$$\text{Log } K_o = \log (C_o / C_w)$$

where C_o is the concentration of the chemical in the oil phase, and C_w is the concentration of the chemical in the aqueous phase.

Log K_h: Henry's Law constant;

$$\log K_h = \log (C_a / C_w)$$

where C_a is the concentration of the chemical in the air phase and C_w is the concentration of the chemical in the aqueous phase.

Log K_d: Soil/water partition coefficient;

$$\text{Log } K_d = \log (C_s / C_w)$$

where C_s is the concentration of the chemical in the soil (solid) phase and C_w is the concentration of the chemical in the aqueous phase.

K_f: Freundlich isotherm; an adsorption isotherm for the chemical is obtained using the Freundlich sorption equation. The linear form of this equation is:

$$\text{Log } X = \text{Log } K_f + 1/n \text{ Log } C$$

where X = mg of chemical per kg of soil, C = equilibrium solution concentration, and K_f and 1/n are the constants that characterize the adsorption capacity for the chemical. When 1/n = 1.0, $K_f = K_d$ (soil/water partition coefficient).

1/n: Measurement of the intensity of adsorption reflecting the degree to which adsorption is a function of concentration.

r^2: Coefficient of determination; a number between 0 and 1, showing how much of a relationship in correlation is due to the factors being compared; for example, 0.7 means 70 percent of variation in the dependent variable is caused by the independent variable (R^2 is not the same as R, the correlation coefficient, which ranges between -1 and +1).

Log K_{oc}: soil/sediment partition (sorption) coefficient; ratio of adsorbed chemical per unit weight of organic carbon in the soil to the concentration of the chemical in solution at equilibrium. A low K_{oc} (high water solubility) indicates a tendency to desorb from soils and sediments (less likely to volatilize from water).

Log K_{oa}: oil/water partition coefficient;

$$\log K_{oa} = \log (C_o / C_a)$$

where C_o is the concentration of the chemical in the oil phase, and C_a is the concentration of the chemical in the air phase.

Log K_{sa}: soil/air partition coefficient;

$\log K_{sa} = \log (C_s / C_a)$

where C_s is the concentration of the chemical in the soil phase, and C_a is the concentration of the chemical in the air phase.

Scale: Method by which the data were attained is identified numerically in the following manner:

1. calculated value
2. experimentally determined in a laboratory
3. value obtained from field studies

*** TRANSFORMATION/DEGRADATION (also referred to as "Transformation")**

This file contains information concerning degradation and transformation processes of the chemicals in a soil environment. Additional information about each chemical is located in either of the two memos for the chemical. The User is strongly advised to consult these memos.

With exception of the parameters defined below, parameters in TRANSFORMATION/DEGRADATION are the same as those in IMMOBILIZATION. Please refer to IMMOBILIZATION for definitions of those parameters found in both files.

C_o (mg/kg): The initial concentration of the chemical in the medium.

K (1/day): Rate constant for a first order reaction. Fast reactions have a large K value.

t(1/2) (days): The time necessary for half of the substance initially present to react (time required for the concentration of a reactant to decrease to half its initial value); for first order reactions, t(1/2) = 0.693/k.

r^2: coefficient of determination; a number between 0 and 1, showing how much of a relationship in correlation is due to the factors being compared; for example, 0.7 means 70 percent of variation in the dependent variable is caused by the independent variable (R^2 is not the same as R, the correlation coefficient, which ranges between -1 and +1.

*** TOXICITY**

This file contains information concerning toxicity for the chemicals included in the Database. Additional information on a chemical is located in either of the two memos for the chemical. In TOXICITY, the first memo appears on the screen; however if it is too lengthy to view completely, the memo should be entered. Instructions on how to enter memos is presented in the next section. The User is strongly advised to consult these memos.

Carcinogenic Risk: Determination of whether exposure to an agent has the potential to increase the incidence of cancer (and how likely a chemical is to be a human carcinogen).

Reference Dose: For systemic toxicants, an estimate of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

Risk Specific Dose: For carcinogens, environmental concentrations that, under specified intake assumptions, correspond to excess lifetime cancer risks of 10^{-6} for class A and B carcinogens, or 10^{-5} for Class C carcinogens.

LC 50 (mg/L): The median lethal concentration; the concentration of the chemical that will produce death in 50 percent of the target population.

LD 50 (mg/L): The median lethal dose; the dosage of the chemical that will produce death in 50 percent of the treated animals.

EC 50: Chemical concentration affecting a specific response (e.g., respiration, loss of equilibrium) by 50% in a given time; in the Microtox(TM) test, sample concentrations resulting in a 50 percent decrease of light produced by the luminescent bacteria. Higher EC 50 values indicate lower toxicity than lower values.

Assay: A toxicity test utilizing organisms to determine toxicological effects. The two microbial bioassays commonly cited in this database are the Ames 'Salmonella typhimurium' mammalian microsome assay and the Microtox(TM) system.

Ames: Measure of the mutagenic potential of hazardous compounds; special strains of 'Salmonella typhimurium' that require histidine to grow are used to test for mutagenicity. When plated on a histidine-free medium, the only bacteria able to form colonies are those that have reverted to the "wild" state and are able to produce their own histidine. Without the addition of test chemicals, this back mutagen occurs at a rate specific to each strain type (spontaneous reversion rate). The addition of chemicals that are mutagenic increases the reversion rate.

Microtox(TM): Aqueous general toxicity assay that measures the reduction in light output produced by a suspension of marine luminescent bacteria ('Photobacterium phosphoreum') in response to an environmental sample. Bioluminescence of the test organism depends on a complex chain of biochemical reactions. Chemical inhibition of any of the biochemical reactions causes a reduction in bacterial luminescence.

Mutagenic Ratio: The ratio of the number of colonies that form in the presence of a test sample to the number of colonies in the absence of a test sample (control growth plate); mutagenic ratio = # of colonies counted/spontaneous revertants.

Mutagenic Dose: Mutation/Metabolic Activation Dose

Scale: Method by which data were attained is identified numerically in the following manner:

1. Calculated value
2. Experimentally determined in a laboratory
3. Value obtained from field studies

*** BIOCONCENTRATION**

This file contains information concerning bioconcentration potential of the chemicals included in the Database. Additional information for each chemical is included in the memo for the chemical. In the BIOCONCENTRATION file, the memo appears on the screen; however if it is too lengthy to view completely, the memo should be entered. Instructions on how to enter memos is presented in the next section.

Log K_{ow}: The ratio of the concentration of the compound relative to the concentration of the compound in water; a measurement of the extent to which a substance partitions itself between octanol and water; the greater the Kow, the smaller will be its tendency to move with the aqueous phase in the subsurface.

Log Bioconcentration (Log BCF): The concentration of the chemical in the organism at equilibrium divided by the concentration of the chemical in the organism's environment (air, water, soil, etc.).

*** REFERENCES**

Information presented in this file is provided so that the User may access the literature source from which information contained in STF 2.0 was compiled. Data in all files, except IDENTIFICATION, are accompanied by a "Short Reference". This "Short Reference" lists the author's and co-author's names and is the link to the full reference citation. The full reference is accessed through the identification number.

Not all references used in the Database are primary sources of information. The type of information source used is identified in this file in a numerical manner:

Source No.	Type of Reference
1	Refereed Journal
2	Non-refereed Journal
3	Government Report
4	Book; Standard Reference

When searching in the REFERENCE file, the exact location of a specific author's contribution is found by referring to the Reference type (2-6), corresponding with the numbers in the selection mode found in each file. For example, 2 indicates "Chemical," meaning that this reference corresponds to data found in the CHEMICAL CHARACTERISTICS file for the selected chemical. In that file, the author's name or "Short Reference" will be found next to the particular contribution. The reference types are given as follows:

2. Chemical
3. Immobility
4. Transformation
5. Toxicity
6. Bioconcentration

In STF 2.0 Database files that contain a reference to **Scale**, "1" refers to calculated data, "2" refers to a value determined experimentally in laboratory, pilot or bench scale studies, and "3" refers to data obtained from field studies.

GETTING STARTED WITH STF 2.0

Once the System Menu has been entered by typing STF at the root directory prompt (typically C:\), the User must then select menu option "S" to enter STF 2.0.

After a few seconds the title page or Introduction appears. Page two of the introduction presents the User with four options:

1) Entering the introductory HELP memo by typing H;

2) Entering INSTALL PRINTER by typing P;

3) Entering COLORS by typing C; and,

4) Entering the STF 2.0 operation modes by striking any other key.

The introductory HELP memo provides an overview of STF 2.0 and contains the introductory instructions that are presented in this section. Once the operation modes have been entered, the User cannot return to the Introduction without exiting and reentering STF 2.0. However, it is unlikely that the User will need to view the HELP memo in the introduction once the operation modes have been entered since additional HELP memos are provided at specific locations in the program.

The INSTALL PRINTER option allows the User to set printer conditions for reports that are generated within STF 2.0. The default command provided is "CHR(15)". This is the command for compressed print for dot matrix type printers. Laser printers have unique compressed print commands and therefore documentation provided with the specific printer should be consulted. Compressed print is recommended due to the large size of reports that may be generated. However, the User may designate any command string acceptable to the printer.

The COLORS option allows the User to change the default colors used for data presentation in STF 2.0, VME and RME. A list of color selections is provided in Appendix B. The syntax must be followed precisely to ensure that the command strings are accepted by the STF 2.0 program.

The STF 2.0 operation modes are entered by striking any other key. Before a key is struck, the printer should be setup as desired since it is not possible to return to the introduction without first exiting STF 2.0. Upon striking a key, the User enters one of the operation modes, i.e., the "Directory" mode, and is presented with an alphabetical listing of the chemicals found in the Database. This chemical list is presented as part of the IDENTIFICATION file.

STF 2.0 OPERATION MODES

The STF 2.0 can be operated in four different modes. These four modes are Directory, View, Filter and Report. The User will determine in which mode to operate based on intended use. The User, however, is able to switch among modes to optimize the usefulness of STF 2.0. An easy access Help memo associated with each of the modes is provided for quick instruction on how to use the available commands in each operation mode. The STF 2.0 operation modes are described in detail below:

*** DIRECTORY OPERATING MODE**

The "Directory" operating mode is the first to be accessed when entering the Database. This mode provides a quick way of finding and reviewing information in any of the Database files. Upon entering STF 2.0, the User is in the IDENTIFICATION file. The User will find options displayed at the bottom of the screen. The letter or key displayed between { } or < > indicates to the User the letter or key to type. The options include:

{V}IEW: Type **V** to enter the "View" operating mode.

{R}EPORT: Type **R** to enter the "Report" operating mode.

{S}ELECT: Type **S** to select and change files. After S is typed, a list of seven key words, corresponding to the seven STF Database information files, will appear. The User chooses the file to enter by typing the number of the desired file. For example, to select a list of references corresponding to the currently accessed file and chemical at which the cursor is positioned, the User types {S}ELECT then {7}. The User will now be located in file 7 (REFERENCES) at the first full reference citation linked to the file from which the references were accessed (i.e., CHEMICAL CHARACTERISTICS, IMMOBILIZATION, etc.). To view the reference, the User must type {V}IEW.

{H}ELP: Type **H** to enter the HELP memo corresponding to the "Directory" operating mode.

{F}IND: Type **F** to execute a search for a specific chemical. After typing **F**, the User is asked to enter the identification number (IDNUM) of the desired chemical. Identification numbers may be found in the list provided with this manual (Appendix D). For most chemicals, the identification number is the CAS number. The User should enter the complete identification number to ensure that the desired chemical will be accessed. After {F}IND has been executed, the cursor is positioned at the matching chemical. If the chemical is not in STF 2.0, the message "no match found" appears in the bottom left hand corner of the screen. Select the {V}IEW option to access information and data pertaining to that chemical.

FI{L}TER: Type **L** to enter the "Filter" or condition operating mode.

<Arrows>: Indicates the four directional arrows on the cursor pad. The up and down arrows allow the User to scroll the screen up and down. The left and right arrows can be used to scan the IDENTIFICATION or present file records before entering the "View" operating mode. The same information available in the "View" mode is available in the "Directory" mode. By scanning to the right, this information can be viewed.

<PgDn> and <PgUp>: Indicates the PgDn (page down) and PgUp (page up) keys. These keys, in addition to the up and down ARROW keys, allow the User to move through the list of chemicals in the STF Database.

{Q}UIT: Type **Q** to exit the STF Database.

Upon entering the IDENTIFICATION file, the User will normally select the chemical for which information is desired by using the {F}IND option, or the <arrow> commands to search alphabetically. If only a common name, or a portion of the name, of the chemical of interest is known, the User may utilize the "Filter" operating mode to find the desired chemical. A chemical is selected by placing the cursor by that chemical. Once the chemical is selected, the User can access any of the files in the database without changing to a different chemical, or can choose the other commands described above as desired.

*** VIEW OPERATING MODE**

The **"View"** operating mode is entered by typing **V** when the User is in the "Directory" operating mode. The User will find options displayed at the bottom of the screen. These options are:

{M}EMOS: Type **M** to enter a memo field. There must be a memo field displayed on the current screen for this option to be implemented. To exit a memo field, the User should type ESC. The PgUp, PgDn, and directional arrow keys are used to move the cursor within a memo field. There are two types of memo fields used in the STF Database:

1) Hidden Memo - Type **M** to view the contents of the memo field.

2) Visible Memo - A portion of the memo field appears on the screen. Type **M** to view the rest of the memo field.

Memos are an integral part of STF 2.0. Therefore, whenever available, the User should read the information in the memo.

{R}EPORT: Type **R** to enter the "Report" operating mode.

{S}ELECT: Type **S** to select a different data file for the same chemical. After **S** is typed, a list of seven key words corresponding to the seven STF Database information files will

appear. The User chooses the file to enter by typing the appropriate number of the file desired. To access complete references cited as short references in Database files 2-6, the User types {S}ELECT {7}, and the full reference pertaining to the information in the file the User was currently accessing will be displayed. The User will remain in the "View" operating mode.

{N}EXT RECORD, {P}REVIOUS RECORD: Type **N** to view the next record concerning the selected chemical. Type **P** to return to the previous record. If only one record exists, or after the last record for the selected chemical within a specific file, the message "Boundary of Locked IDNUM Encountered" will appear. When this occurs, strike any key to continue.

{U}NLOCK: Type **U** to unlock boundaries to allow the User to leave records for a specific chemical using the **P** or **N** keys, and to move to records for the next chemical in the file. To reset the lock, the User should type **Q** to exit the "View" operating mode, re-select the desired chemical from the "Directory" mode, and type **V** to re-enter the "View" operating mode, and the records for the chemical will again be locked.

The word *LOCKED* appears in the upper right corner of the screen when the boundaries are locked. The IDENTIFICATION file cannot be locked. In all files, if the User is at the top of the file and the {P} option is selected, the message "BEGINNING-OF-FILE ENCOUNTERED, PRESS ANY KEY TO CONTINUE" will appear. If the User is at the bottom of the file and the option {N} is selected, the message "END-OF-FILE ENCOUNTERED, PRESS ANY KEY TO CONTINUE" will appear.

{H}ELP: Type **H** to enter the HELP memo that corresponds to the "View" operating mode.

{Q}UIT: Type **Q** to exit the "View" operating mode. The User will return to the "Directory" operating mode.

<PgDn>, <PgUp>: Use these keys to "turn the pages" in sequence in files that have multiple screens of information for a selected chemical. The files with multiple screens are 2 (CHEMICAL), 3 (IMMOBILIZATION), 4 (TRANSFORMATION), and 5 (TOXICITY).

{F}IND: Type **F** to execute a search for a specific chemical. After typing **F**, the User is asked to enter the identification number (IDNUM) of the desired chemical. Identification numbers may be found in the list provided with this manual (Appendix D). For most chemicals, the identification number is the CAS number for the chemical. The User should enter the complete identification number to ensure that the specific chemical is identified.

*** FILTER OPERATING MODE**

The "Filter" or condition operating mode allows the User to search or select for a specific chemical or group of chemicals based on information found in STF 2.0 (i.e., physical properties, rates, literature citations, etc.). The "Filter" mode is accessed from the "Directory" or "Report" operating modes by typing FI{L}TER. In the "Report" mode, a printout or file of the information will be generated.

A different set of conditions is available to the User, depending on the information in the file from which the "Filter" mode is entered. For example, if the "Filter" mode is entered while the User is in the TOXICITY file, conditions applicable only to information concerning toxicity will be presented. Once a condition has been specified, it remains in the condition list and is available for use unless it is deleted from the list.

Options available to the User in the "Filter" operation mode, as shown on the bottom of the screen, include:

{A}DD: Type **A** to select conditions upon which the filter/search criteria will be based. A chart with three sections containing options concerning data/information fields, operators and connectors will appear on the screen. The User will be prompted to enter the following information:

1) Field number, then strike <RETURN>

2) Operator number, then strike <RETURN>

3) Desired value for comparison, then strike <RETURN>

4) A connector if a more complex condition is desired. If so, repeat steps 1-4. If no connector is desired, strike <RETURN>. When creating a subset of data, the User should usually use the connector option to exclude the value zero from the subset. STF 2.0 utilizes zero as the default number for data fields, even though zeroes do not appear on the screen.

5) A custom description (i.e., the User may specify a descriptive name for the condition), then strike <RETURN>. If no custom description is specified, the program defined string that appears in the custom description field becomes the condition name.

{S}ELECT: Type **S** to select an existing condition from the condition list. The User will be prompted to enter the corresponding record number for the specific condition desired. Then strike <RETURN>.

{H}ELP: Type **H** to enter the HELP memo corresponding to the Filter operation mode.

<PgUp>, <PgDn>: Use these keys to scan conditions if multiple screens of conditions exist.

<DELETE>: Strike the DELETE key to remove a condition from the condition list. The User will be prompted to enter the corresponding record number for the specific condition to delete. Then strike <ENTER>.

{Q}UIT: Type **Q** to cancel all current filter conditions and return the User to the point from which the "Filter" operating mode was entered.

When creating a new filter condition, the User is also given two options pertaining to the type of filter to be created. The following prompt appears after the creation of a filter;

Create a global filter Y/N

By typing {Y}, a global filter is created and the flag "GLOBAL FILTER ON" appears in the upper right corner of the screen. By typing {N}, a local filter is created and the flag "FILTER" appears in the same place. The differences between local and global filter applications are summarized below.

Local filter-

A local filter is only valid within the file it was created. For example, if a references-based chemical list is generated by setting a filter in the REFERENCE file and {N} is typed at the prompt, then that list of chemicals can only be accessed in the REFERENCE file and is lost when the User changes files.

Global filter-

A global filter creates a condition-based list according to the file from which it was entered, but unlike a local filter, the list of chemicals can be transferred from file to file. For example, if a identification-based chemical list is generated by setting a filter in the IDENTIFICATION file and {Y} is typed at the prompt, then that list of chemicals can be accessed from any of the seven files.

When the filter mode is re-entered (by typing FI{L}TER) and the flag "GLOBAL FILTER ON" appears in the upper right corner of the screen, the User is prompted with the following options:

{Q}UIT: Allows the User to leave the "Filter" mode

{G}LOBAL: Allows the User to set additional conditions to create a new global filter. These conditions can be set either by selecting a condition already in a STF 2.0 file or by adding new conditions. The new global filter will not supercede the existing filter, but both the new and existing filters will remain for use until deleted.

{S}ELECT: Returns the User to the "Filter" mode where a different filter may be selected or created.

The enhanced "Filter" operating mode in STF 2.0 allows the User to set either file-specific local filters or to create subsets of chemicals that can be carried file to file depending on intended use. For example, when an application calls for dealing only with specific chemicals, those chemicals are put into a subset using the global filter option.

*** REPORT OPERATING MODE**

The "Report" operating mode allows the User to extract data and information contained in STF 2.0. The "Report" mode is accessed from the "Directory" or "View" operating modes by typing {R}EPORT. In the "Report" mode, a printout or file of the information will be generated. Reports are created either by sending the information to the printer or to a DOS text file. A report generated for a printer, especially a laser type printer, requires that the correct command string has been entered in the INSTALL PRINTER introductory option. The default command string is for compressed print and is valid for most dot matrix type printers.

Once the STF 2.0 operating modes have been entered, the only way that the printer command string can be modified is to exit and re-enter the Database. Please refer to the INSTALL PRINTER option in the "GETTING STARTED WITH STF 2.0" section for additional instructions.

Upon entering the "Report" mode, the following options are available:

{1}: Report for current record of the selected chemical in this file.

A report can be prepared for the specific chemical and file that the User is currently accessing. To access this option, type **1**. The User will receive a printout of the information and data for the specific chemical and file being accessed. To terminate printing, the User should strike ALT-C (NOTE: THIS WILL CAUSE THE USER TO EXIT THE STF PROGRAM).

{2}: Report for all records of the selected chemical in this file.

This selections allows the User to print a report of multiple records for the selected chemical in this file. For example, if a particular chemical has three different Immobilization records, this option will print all three files. To access this option, type **2**.

{3}: Report for all records of the filtered group in this file.

A report can be prepared for a subset of chemicals within the current file, which can be created using the "Filter" operating mode. This allows the User to print a report containing information for an entire subset of chemicals. To access this option, type **3**.

{4}: Report for all records of the selected chemical in all files.

A report containing information and data from the seven STF database files for the chemical currently being accessed will be printed. To access this option, type **4**.

{H}: Help

Type **H** to access the HELP memo associated with the "Report" operating mode.

{0}QUIT: Allows the User to leave the "Report" mode

Type **0** to return to the operating mode ("Directory" or "View") from which the "Report" operating mode was entered.

After options 1, 2, 3, or 4 have been selected, the User is prompted as to the destination of the report file. To send the report to the printer, the filename must be blank. This is accomplished by typing {SPACEBAR}, {ENTER}. To send the report to a file, enter the filename and correct pathway. For example, A:\REPORT.ONE will send the report to the file "REPORT.ONE" to floppy drive a:.

For example, to generate a report for Option 1 for a specific chemical, use the following command sequence:

{R}EPORT (enters "Report" operating mode)

{1} (selects option 1)
<SPACEBAR> (designates the printer as the report destination)

<ENTER> (initiates printing)

Formats of STF 2.0 file reports are given in Appendix E.

A brief tutorial on the use of the STF 2.0 operating modes is presented in Appendix C.

PART II

DESCRIPTION OF THE VIP AND RITZ MODEL EDITORS

The primary purpose of the VIP model editor (VME) and RITZ model editor (RME) is to aid in the creation of input files for the VIP and RITZ models. Input files created in RME and VME are built using three input sources: 1) site specific parameters, entered directly by the user, 2) literature based parameters, entered from STF 2.0, where available, and 3) default parameters, provided as part of the initial setup of new files in RME and VME.

RME and VME are designed to interface with STF 2.0, allowing the User to draw upon studies published in the literature to assess potential transport and fate of chemicals in the vadose zone. Numbers taken from the database are useful for preliminary predictions before in-depth site-specific characterization studies are available. The User should always choose values that are site-specific over those available in STF 2.0.

GETTING STARTED WITH VME AND RME

Once the System Menu has been entered by typing STF at the root directory prompt (typically C:\), the User then types the desired menu option, either {VME} or {RME} editor. Input files created in an editor may be used only in the respective model, since there are significant differences between models.

After a model editor has been selected and entered, the User must enter a filename or leave the field blank to exit. The filename can either be an already existing editor file or a new editor file. The editor requires only the filename to be entered. The file extensions .TOV ("to VIP") and TOR ("to RITZ") are provided as part of all model editor files. The .TOR and .TOV file extensions are used by the program to distinguish between models. If the filename entered is that of an already existing file, that file must be located in the \STFBASE directory, or the editor will not find it. The editor will create a new file with that name. After the filename has been typed, strike <ENTER>. The program now builds different temporary files and indices to allow interaction with STF 2.0. This process may take several minutes.

After the link between STF 2.0 and the model editor has been completed, a list of parameter names appears on the screen. The definitions of each of the parameters and brief instructions as to what types of data should be entered appear as prompt lines immediately below the parameter list. The prompt lines change according to the cursor position on the screen. For complete parameter definitions and other pertinent information regarding these parameters and their use, please refer directly to the RITZ and VIP user's manuals (Norziger et al., 1988; Stevens et al., 1988; Stevens et al., 1989).

The next step required is that of selecting the chemical(s) of interest. This is done by entering (please refer to the {E}DIT command below for instruction) the STF identification numbers into Line 00 of the parameter list. For each chemical listed (up to twelve), a separate column is initialized for input. Computer runs for different chemicals can be created in the same editor file. At least one chemical identification number must be entered to link the model editor with STF 2.0.

After the chemicals have been selected, additional indices are built by the program. This step also may take several minutes based on the number of chemicals selected and the amount of information contained in STF 2.0 for each chemical. When editing a file that has been previously created, this step is necessary only if the User wishes to change one of the chemicals to be edited.

RME AND VME OPERATING MODE

RME and VME, unlike STF 2.0, have only one operating mode. The screen can be divided into three distinct areas; each area is described in detail below. Where differences between RME and VME occur, separate instructions for each editor will be given under the respective headings.

The first area consists of the top two lines of the screen and is used to orient the User. The model interface is shown in the upper left corner of the screen. It will read either "STF to VIP Interface" or "STF to RITZ Interface." The file in use appears in the upper right corner of the screen. The second line consists of column headings. Line # and DESC--------- (description) are fixed, and depending on the number of runs, Title followed by a number (1-12) will appear above the remaining columns as determined by the number of STF identification numbers assigned. For instruction on how to enter identification numbers, the User should refer to the {E}DIT command below.

The second area consists of the parameter list and prompt lines. The parameter list is different for each model. Parameters that are designated by the lucky charm (w) symbol indicate those parameters that can be extracted from STF 2.0. For specific instructions on how to extract values from STF 2.0, the User should refer to the {E}DIT command below. The prompt lines are found directly below the parameter list and correspond to the parameter at which the cursor is found. Brief descriptions of each parameter and information required to correctly enter a parameter, i.e. proper units, etc., are contained in the prompt lines.

The third area consists of the command line at the bottom of the screen. Each command is described in detail below:

{E}DIT: Type {E} to edit a model parameter. Upon typing {E}, the cursor is located in the first "run" or parameter column. At this point, the User has several options:

Site-specific parameters: The User may enter site-specific parameters manually by typing the values directly from the keyboard. Strike <ENTER> when finished.

{F9}: By typing {F9}, the User selects the default parameter provided as part of the initial parameter list in the model editors.

{F10}: {F10} should be typed only when editing parameters that are highlighted by the lucky charm (w) symbol. If values are available in STF 2.0, a pop up table containing a list of these values and conversion information will appear on the screen. Select the desired information using the <arrows> and strike <ENTER>. If the STF field for the desired parameter is empty, the default value is returned and no table appears.

{CTRL-W}: To return to the main menu, strike the {CTRL} and {W} keys simultaneously.

{G}OTO: Type {G} to move directly to a specific point in the parameter list. This can be accomplished using the following options that appear when {G} is typed:

{T}OP: Type {T} to return to the top of the parameter list.

{B}OTTOM: Type {B} to go to the bottom of the parameter list.

{L}INE: Type {L} and enter the line number of the desired parameter, then strike <ENTER>.

<ARROWS>: The up and down arrows are for changing parameters on screen or in tables and for changing columns when editing. The right and left arrows are used to scroll the screen left or right when viewing different columns or to move the cursor when editing.

{C}HANGE FILE: Type {C} to change the file to be edited. The User is then prompted to enter the filename, as before. If the file to be edited is in the \STFBASE directory, then that file will be loaded. If the file is not located in the directory, then a new file by that name will be created for editing. If {C} is typed, but the User decides to remain in the same file, type the filename of the current file being edited.

{H}ELP: Type {H} to review instructions presented in this manual.

{Q}UIT: Type {Q} to exit the model editor. As part of the exiting process, RME and VME will prepare the input files for the RITZ and VIP models. Two different processes are conducted, depending upon which model editor is exited:

RME: The RITZ model can only handle one run at a time. Therefore, when multiple runs have been created in RME, one RITZ input file is created for each run/column in the current file. For example, if the current RME file was named “RUN.TOR” and contained two columns, then upon exiting RME, RITZ input files “RUN1.INP” and “RUN2.INP” are created and stored in the \STFBASE directory.

VME: The VIP model has two different run formats. These run formats are single and multiple. Upon exiting VME, a data file for use in the VIP multiple run format is created. For example, if the current VME file was named “RUN.TOV”, upon exiting, VIP input file “RUN.DAT” would be created and stored in the \STFBASE directory. Only one input file is created, even with multiple columns in “RUN.TOV” file.

RUNNING VME AND RME INPUT FILES IN VIP AND RITZ MODELS

Upon exiting VME or RME, the User is transferred by batch file directly into the VIP or RITZ model, respectively. The User must then run or exit the model. Brief instructions on how to run model editor input files in the models are included below. For in depth instruction, the model user's manuals should be consulted (Nofziger et al., 1988; Stevens et al., 1988; Stevens et al., 1989).

VIP: The first prompt presented to the User upon exiting VME asks the User which run format will be used in the model. To run files created in VME, the User must type {2} for multiple run format, even if the input file created has only one column/run. The User is then prompted to enter the filename from which the data will be entered. Normally this would be the current file created upon exiting VME. For example, if the current filename was "RUN.TOR" then the model input file to be entered would be called "RUN.DAT." The third step requires the User to designate the main output file, such as "RUN.OUT." The fourth step prompts the User to characterize the type of output desired. There are six questions that must be answered by typing {Y}ES or {N}O. Please consult the VIP user's manual for specific descriptions of each option. In the fifth and final step, the User must input the number of columns/runs that are found in the input file. The VIP program at this point begins to execute. For in depth explanation of the output generated during execution, please consult the VIP user's manual.

RITZ: Upon exiting RME, the User is taken to an initial introduction or title page of the RITZ model. Strike any key to proceed to the next page. The User is then presented with a default parameter list. To load the input file created in RME, the User must type the function key <F7> and enter the file name. Remember that the RITZ model can only evaluate one run at a time. For example, if the current filename was "RUN.TOR" and the file had two columns/runs, then upon exiting RME, the files "RUN1.INP" and "RUN2.INP" would be created. Type <F7> then select "RUN1.INP" or "RUN2.INP" to be run in RITZ. Once the program has completed execution, the User may re-enter RITZ and select the second model input file for execution. The RITZ also will allow parameters to be changed after the RME input file has been loaded. For further instructions or for an in-depth decription of output generated during the execution of RITZ, please consult the RITZ user's manual.

REFERENCES

Nofziger, D.L., J.R. Williams, and T.E. Short. 1988. Interactive Simulation of the Fate of Hazardous Chemicals During Land Treatment of Oily Wastes: RITZ User's Guide. EPA/600/8-88-001, Robert S. Kerr Environmental Research Laboratory, U.S. Environmental Protection Agency, Ada, OK.

Stevens, D.K., W.J. Grenney, and Z. Yan. 1988. VIP: A Model for the Evaluation of Hazardous Substances in the Soil, Version 3.0. Civil and Environmental Engineering, Utah State University, Logan, UT 84322-4110.

Stevens, D.K., W.J. Grenney, Z. Yan, and R.C. Sims. 1989. Sensitive Parameters Evaluation for a Vadose Zone Fate and Transport Model. EPA/600/2-89/039, Robert S. Kerr Environmental Research Laboratory, U.S. Environmental Protection Agency, Ada, OK.

APPENDIX A

INSTALLATION INSTRUCTIONS

APPENDIX A

INSTALLATION INSTRUCTIONS

Soil Transport and Fate Database 2.0 and Model Management System

The diskettes included in the Soil Transport and Fate Database and Model Management System contain STF 2.0, RITZ and VIP model editors, and RITZ and VIP models.

Minimum System Requirements:

- IBM XT Compatible (AT or better is strongly recommended)
- 640 K Ram Memory
- Math Coprocessor (for VIP and RITZ models only)
- Hard Disk with 12.5 Mbytes free
- Supports any display standard (MDA,CGA,EGA)
- Config.sys File must contain the following lines:

```
FILES  = 25
BUFFER = 10
```

Installation:

To install STF to your hard disk,

1. Insert **STF Disk 1** into disk drive A (or drive B).

2. At the DOS prompt, type **a:install (or b:install), then** press **Enter**

3. Follow the on screen prompts to complete the installation.

You will be prompted for the drive and directory where STF is to be installed. Press **Enter** to accept the default **C:\STFBASE** or choose a different drive and/or directory. The installation program will create the directory if it does not already exist. The installation program will also ask for permission to modify your config.sys file (if necessary).

A Batch File called STF.BAT will be created in the root directory of the drive you choose for installation. If you have a file named STF.BAT in the root directory, you may want to rename it or it will be overwritten.

Startup:

1. At the DOS prompt type C: (or the drive you choose) then press **Enter.**
2. At the DOS prompt type **CD ** then press **Enter**.
3. At the DOS prompt type **STF** then press **Enter.**

The program is run by typing {STF}, then <ENTER> at the C:\ prompt.

Microsoft Windows and the STF Database:

Currently the STF Database 2.0 is not compatible with Microsoft Windows Version 3.0, and therefore can not be initiated from Windows. If the User has Windows installed, one must "EXIT" Windows before initiating the STF Database.

APPENDIX B

COLOR OPTIONS

APPENDIX B

COLOR OPTIONS

Upon entering the color option menu, the following line appears:

SCREEN	STATUS	WINDOW	PROMPT	HILITE
R+/N,N/W	BU+/N,N/W	R+/N,N/W	GR+/N,N/W	N/W

Where:

SCREEN - Overall screen colors and appearance.

STATUS - The topmost line of the screen.

WINDOW - Lines 1-21 or working area of the screen.

PROMPT - Lines 22-24, the command line.

HILITE - Colors of any highlighted information.

Two default options are provided and are implemented by typing either {MONO} or {COLOR}, depending on the monitor type. If the monitor type is monochrome, there is no need to change the color option. If the monitor is color, type {COLOR} <ENTER> under the SCREEN option. The color default line is shown below:

SCREEN	STATUS	WINDOW	PROMPT	HI-LITE
W+/B,N/W	R/B,N/W	R+/B,N/W	GR+/B,N/W	N/W

The User may use the color chart provided on the following page to change to other color options. The color option syntax must be followed exactly. If syntax is not followed, errors forcing the User out of the STF program are probable. If mistakes are made, re-enter the color option and type {COLOR} or {MONO} to return to default options.

Color Chart

Green	G	Lt Green	G+
Cyan	BG	Lt Cyan	BG+
Red	R	Lt Red	R+
Magenta	BR	Lt Mag	BR+
Brown	GR	Yellow	GR+
Lt Gray	W	White	W+

APPENDIX C

TUTORIAL

APPENDIX C

TUTORIAL

The following tutorial (using the chemical Benzene) is designed to introduce the User to each of the operation modes in STF 2.0. The Keystrokes are found in the "COMMAND" column with comments and descriptions to the right. The tutorial is designed to begin at the System menu. If STF 2.O has already been entered, the User may exit and beqin again or begin at that step corresponding to the present location in the Database.

No	COMMAND	COMMENTS/DESCRIPTION
1	{S}	Enter STF 2.0 from the system menu
2	<ENTER>	Continue to the next page
3	{H}	Enter the Introductory Help Memo
4	<ARROWS> <PG UP> <PG DN>	Browse through the Help Memo
5	<ESC>	Exit memo and return to title page
6	<ENTER>	Continue to the next page
7	<ENTER>	Enter the "Directory" mode (Chemical List)
8	{F}	Execute the Find command
9	{71-43-2} <ENTER>	Identification number for Benzene
10	{V}	Enter "View" mode
11	{S} {2}	Select the CHEMICAL CHARACTERISTICS File
12	<PG DN> <PG DN> <PG DN>	"Turn" the page (total of 4 pages)

13	{M}	Enter Comments Memo on last page of CHEMICAL CHARACTERISTICS
14	<ARROWS> <PG DN> <PG UP>	Browse through Comments Memo
15	<ESC>	Return to the main file
16	{S} {3}	Select the IMMOBILIZATION file
17	<PG DN> <PG UP>	"Turn" the page (total of 3 pages)
18	{S} {4}	Select the TRANSFORMATION/ DEGRADATION file
19	<PG DN> <PG DN>	"Turn" the page (total of 3 pages)
20	{S} {5}	Select the TOXICITY file
21	{M}	Enter Toxicity Data Memo (already appears partially on screen)
22	<ESC>	Exit memo
23	<PG DN>	"Turn" the page (total of 2 pages)
24	{M}	Enter Short Reference and Comments Memo
25	<ESC>	Exit memo
26	{S} {6}	Enter the BIOCONCENTRATION file
27	{M}	Enter Bioconcentration Memo (already appears partially on screen)
28	<ESC>	Exit memo

29	{S} {7}	Enter REFERENCE file; the first reference of the BIOCONCENTRATION file appears, since REFERENCES was entered from BIOCONCENTRATION
30	{N} {P}	N for next record and P for record to move through REFERENCES
31	{S} {7}	Move to the top of the Benzene References (CRC Handbook)
32	{Q}	Enter the “Directory” mode
33	{k } {m }	View data presented in spreadsheet format
34	<PG DN> <PG UP> {k } {m}	Scan References in the “Directory” mode
35	{S} {2}	Select the CHEMICAL CHARACTERISTICS file
36	{k } {m }	Scroll right and view data in the CHEMICAL CHARACTERISTICS file
37	{L}	Enter “Filter” mode in CHEMICAL CHARACTERISTICS file (on screen is the Current Condition List)
38	{S} {1} <ENTER>	Select option 1 from Condition List (1 High M.W. > 400); a list of 11 chemicals appears on screen, starting with Endosulfan and ending with Toxaphene
39	{V}	Enter “View” mode for Endosulfan
40	<PG DN>	“Turn” page, note M.W. = 406.95
41	{Q}	Enter “Directory” mode and recreate list (since the condition selected was not a Global Filter, it must be used only in the CHEMICAL CHARACTERISTICS file)

42	{L}	Enter “Filter” mode
43	<DELETE> {11} <ENTER>	Delete option 11 from Conditions List
44	{A}	Add a new filter to the Conditions List
45	{2} <ENTER>	Designate “Use or Occurrence” as the parameter on which the filter is based
46	{7} <ENTER>	Designate “Contains” as the search criteria
47	{SOLVENT} <ENTER>	“Solvent” is the key word for the search
48	<ENTER>	No connector selected
49	{SOLVENTS}	The custom description that will appear in the Condition List for future use
50	{Y}	Build a Global Filter allowing the User to transfer the list of solvents between files
51	{S} {5}	Enter the TOXICITY file (notice the Global Filter is “on”; indicator in the upper right hand corner of the screen)
52	{L}	Re-enter the “Filter” mode
53	{G}	Allow the User to Filter the current Global set of chemicals further using TOXICITY parameters
54	{A}	Add an additional criteria to current chemical
55	{6} <ENTER>	Designate LD 50 (mg/kg) as the parameter
56	{6} <ENTER>	Designate “< or =” as search criteria

57	{10} <ENTER>	Set 10 (mg/kg) as the limiting value
58	{A}	Enter "and" as the connector (allows for additional criteria for search)
59	{6} <ENTER>	Designate LD 50 (mg/kg) as the parameter
60	{3} <ENTER>	Designate ">" as search criteria
61	{0} <ENTER>	Enter "0" as the lower limit (this stops excludes all blank records from the list)
62	<ENTER>	No connector selected
63	{HIGHLY TOXIC SOLVENTS} <ENTER>	Custom Description that will appear in the Condition List (a list of 3 chemicals is created)
64	{l }	Place the cursor on Furan
65	{R}	Enter the "Report" mode
66	{1}	Select current chemical for report option
67	{A:TOXSOLV} <ENTER> <ENTER>	Indicate destination for file (a disk must be in drive a:)
68	{N}	No additional conditions are to be set (report is printed to a:)
69	{Q}	Exit STF 2.0

APPENDIX D

STF DATABASE 2.0 CHEMICAL LIST

SOIL TRANSPORT AND FATE DATABASE CHEMICALS

208-96-8	Acenaphthylene
75-07-0	Acetaldehyde
104-06-3	Acetanilide, 4'-formyl-, 4'-thiosemicarbazone
141-78-6	Acetidin
67-64-1	Acetone
75-05-8	Acetonitrile
	Acetophenone
81-81-2	3-(alpha-Acetonylbenzyl-4-hydroxycoumarin
53-96-3	2-Acetylaminofluorene
591-08-2	1-Acetyl-2-thiourea
107-02-8	Acrolein
79-06-1	Acrylamide
79-10-7	Acrylic acid
107-13-1	Acrylonitrile
309-00-2	Aldrin
107-18-6	Allyl alcohol
92-67-1	4-Aminobiphenyl
50-07-7	6-Amino-1,1a,2,8,8a-hexahydro-8-(hydroxymethyl)-8a-methoxy-5-methyl-carbamate
2763-96-4	5-(Aminomethyl)-3-isoxazolol
504-29-0	2-Aminopyridine
61-82-5	Amitrole
62-53-3	Aniline
120-12-7	Anthracene
7440-36-0	Antimony
140-57-8	Aramite
53469-21-9	Aroclor 1242 (PCB's)
11097-69-1	Aroclor 1254 (PCB's)
11096-82-8	Aroclor 1260 (PCB's)
7440-38-2	Arsenic
7778-39-4	Arsenic acid
1303-28-2	Arsenic pentoxide
1327-53-3	Arsenic trioxide
115-02-6	Azaserine
7440-39-3	Barium
225-51-4	Benz[c]acridine
56-55-3	Benz[a]anthracine
71-43-2	Benzene
95-53-4	Benzene, 2-amino-1-methyl
106-49-0	Benzene, 4-amino-1-methyl
98-87-3	Benzene, dichloromethyl
98-05-5	Benzenearsonic acid
98-09-9	Benzenesulfonyl chloride
108-98-5	Benzenethiol
92-87-5	Benzidine
205-99-2	Benzo[b]fluoranthene
205-82-3	Benzo[j]fluoranthene
207-08-9	Benzo[k]fluoranthene
50-32-8	Benzo[a]pyrene
106-51-4	p-Benzoquinone
98-07-7	Benzotrichloride
100-44-7	Benzyl chloride
7440-41-7	Beryllium
111-91-1	Bis(2-chloroethoxy)methane
111-44-4	Bis(2-chloroethyl) ether
494-03-1	N,N-Bis(2-chloroethyl)-2-naphthylamine
108-60-1	Bis(2-chloroisopropyl)ether
542-88-1	Bis(chloromethyl)ether
117-81-7	Bis(2-ethylhexyl) phthalate
598-31-2	Bromoacetone
75-27-4	Bromodichloromethane
74-83-9	Bromomethane
357-57-3	Brucine
1338-23-4	2-Butanone peroxide
71-36-3	n-Butyl alcohol
85-68-7	Butyl benzyl phthalate
88-85-7	2-sec-Butyl-4,6-dinitrophenol

7440-43-9	Cadmium
592-01-8	Calcium cyanide
75-15-0	Carbon disulfide
75-87-6	Chloral
305-03-3	Chlorambucil
57-74-9	Chlordane
107-20-0	Chloroacetaldehyde
106-47-8	p-Chloroaniline
108-90-7	Chlorobenzene
510-15-6	Chlorobenzilate
126-99-8	2-Chloro-1,3-butadiene
59-50-7	p-Chloro-m-cresol
124-48-1	Chlorodibromomethane
106-89-8	1-Chloro-2,3-epoxypropane
110-75-8	2-Chloroethyl vinyl ether
67-66-3	Chloroform
74-87-3	Chloromethane
107-30-2	Chloromethyl methyl ether
91-58-7	2-Chloronaphthalene
95-57-8	2-Chlorophenol
5344-82-1	1-(o-Chlorophenyl)thiourea
107-05-1	3-Chloropropene
542-76-7	3-Chloropropionitrile
3165-93-3	4-Chloro-o-toluidine, hydrochloride
7440-47-3	Chromium
218-01-9	Chrysene
8007-45-2	Coal tar
8001-58-9	Creosote
1319-77-3	Cresols
108-39-4	m-Cresol
95-48-7	o-Cresol
106-44-5	p-Cresol
4170-30-3	Crotonaldehyde
57-12-5	Cyanide
506-68-3	Cyanogen bromide
506-77-4	Cyanogen chloride
14901-08-7	Cycasin
110-82-7	Cyclohexane
108-94-1	Cyclohexanone
131-89-5	2-Cyclohexyl-4,6-dinitrophenol
50-18-0	Cyclophosphamide
20830-81-3	Daunomycin
72-54-8	DDD
72-55-9	DDE
50-29-3	DDT
2303-16-4	Diallate
226-36-8	Dibenz[a,h]acridine
224-42-0	Dibenz[a,j]acridine
53-70-3	Dibenz[a,h]anthracene
194-59-2	7H-Dibenzo[c,g]carbazole
192-65-4	Dibenzo[a,e]pyrene
189-64-0	Dibenzo[a,h]pyrene
189-55-9	Dibenzo[a,i]pyrene
96-12-8	1,2-Dibromo-3-chloropropane
106-93-4	1,2-Dibromoethane
74-95-3	Dibromomethane
84-74-2	Di-n-butyl phthalate
95-50-1	o-Dichlorobenzene
541-73-1	m-Dichlorobenzene
106-46-7	p-Dichlorobenzene
91-94-1	3,3'-Dichlorobenzidine
764-41-0	1,4-Dichloro-2-butene
75-71-8	Dichlorodifluoromethane
75-34-3	1,1-Dichloroethane
107-06-2	1,2-Dichloroethane
25323-30-2	Dichloroethylene
75-35-4	1,1-Dichloroethylene
540-59-0	1,2-Dichloroethylene
156-60-5	1,2-trans-Dichloroethylene
75-09-2	Dichloromethane
120-83-2	2,4-Dichlorophenol
87-65-0	2,6-Dichlorophenol
94-75-7	2,4-Dichlorophenoxyacetic acid
696-28-6	Dichlorophenylarsine
78-99-9	1,1-Dichloropropane
78-87-5	1,2-Dichloropropane
142-28-9	1,3-Dichloropropane
96-23-1	1,3-Dichloro-2-propanol
616-23-9	2,3-Dichloro-1-propanol
563-54-2	1,2-Dichloropropene
542-75-6	1,3-Dichloropropene
60-57-1	Dieldrin
1464-53-5	1,2:3,4-Diepoxybutane

692-42-2	Diethylarsine
1615-80-1	N,N'-Diethylhydrazine
3288-58-2	O,O-Diethy S-methyl ester of phosphorodithioc acid
311-45-5	O,O-Diethylphosphoric acid, O-p-nitrophenyl ester
84-66-2	Diethyl phthalate
297-97-2	O,O-Diethyl O-2-pyrazinyl phorodithioate
56-53-1	Diethylstilbesterol
94-58-6	Dihydrosafrole
51-43-4	3,4-Dihydroxy-alpha-(methylamino) methyl benzyl alcohol
55-91-5	Diiosopropylfluorophosphate
60-51-5	Dimethoate
119-90-4	3,3'-Dimethoxybenzidine
60-11-7	p-Dimethylaminoazobenzene
57-97-6	7,12-dimethylbenz[a]anthracene
119-93-7	3,3'-Dimethylbenzidine
80-15-9	alpha,alpha-Dimethyl-b enzylhydro peroxide
79-44-7	Dimethylcarbomayl chloride
57-14-7	1,1-Dimethylhydrazine
540-73-8	1,2-Dimethylhydrazine
39196-18-4	3,3'-Dimethyl-1-(methylthio)-2-buta none, O-[(methylamino) carbonyl]oxme
122-09-8	alpha,alpha-Dimethyl-phenethylamine
105-67-9	2,4-Dimethylphenol
131-11-3	Dimethyl phthalate
77-78-1	Dimethyl sulfate
99-65-0	Dinitrobenzene
534-52-1	4,6-Dinitro-o-cresol
51-28-5	2,4-Dinitrophenol
121-14-2	2,4-Dinitrotoluene
606-20-2	2,6-Dinitrotoluene
117-84-0	Di-n-octyl phthalate
123-91-1	1,4-Dioxane
122-39-4	Diphenylamine
122-66-7	1,2-Diphenylhydrazine
142-84-7	Dipropylamine
621-64-7	Di-n-propylnitrosamine
298-04-4	Disulfoton
541-53-7	2,4-Dithiobiuret
115-29-7	Endosulfan
72-20-8	Endrin
140-88-5	Ethyl acrylate
51-79-6	Ethyl carbamate
107-12-0	Ethyl cyanide
110-80-5	Ethylene glycol monoethyl ether
75-21-8	Ethylene oxide
111-54-6	Ethylenebisdithiocarbamic acid
151-56-4	Ethyleneimine
96-45-7	Ethylenethiourea
97-63-2	Ethyl methacrylate
62-50-0	Ethyl methanesulfonate
206-44-0	Fluoranthene
86-73-7	Fluorene
640-19-7	2-Fluoroacetamide
144-49-0	Fluoracetic acid
62-74-8	Fluoroacetic acid, sodium salt
50-00-0	Formaldehyde
64-18-6	Formic acid
110-00-9	Furan
98-01-1	2-Furaldehyde
765-34-4	Glycidaldehyde
76-44-8	Heptachlor
1024-57-3	Heptachlor epoxide
118-74-1	Hexachlorobenzene
35065-27-1	2,2',4,4',5,5'-Hexachlorobiphenyl
87-68-3	Hexachlorobutadiene
319-84-6	1,2,3,4,5,6-Hexachlorocyclo-hexane, alpha isomer
58-89-9	1,2,3,4,5,6-Hexachlorocyclo-hexane, gamma isomer
77-47-4	Hexachlorocyclopentadiene
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
9999-00-2	Hexachlorodibenzofurans
67-72-1	Hexachloroethane
465-73-6	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8, 8a-hexahydro-1,4:5,8-endo,endo-dimethanonaphthalene

70-30-4	Hexachlorophene
1888-71-7	Hexachloropropene
302-01-2	Hydrazine
74-90-8	Hydrocyanic acid
7783-06-4	Hydrogen sulfide
75-60-5	Hydroxydimethylarsine oxide
193-39-5	Indeno(1,2,3-cd)pyrene
74-88-4	Iodomethane
624-83-9	Isocyanic acid, methyl ester
78-83-1	Isobutyl alcohol
120-58-1	Isosafrole
143-50-0	Kepone
303-34-4	Lasiocarpine
7439-92-1	Lead
301-04-2	Lead acetate
108-31-6	Maleic anhydride
123-33-1	Maleic hydrazide
109-77-3	Malonitrile
148-82-3	Melphalan
7439-97-6	Mercury
126-98-7	Methacrylonitrile
74-93-1	Methanethiol
67-56-1	Methanol
91-80-5	Methapyrilene
16752-77-5	Metholmyl
72-43-5	Methoxychlor
75-55-8	2-Methylaziridine
79-22-1	Methyl chlorocarbonate
56-49-5	3-Methylcholanthrene
101-14-4	4,4'Methylenebis (2-chloroaniline)
78-93-3	Methyl ethyl ketone
60-34-4	Methyl hydrazine
108-10-1	Methyl isobutyl ketone
75-86-5	2-Methyllactonitrile
80-62-6	Methyl methacrylate
66-27-3	Methyl methanesulfonate
116-06-3	2-Methyl-2-(methylthio) propional dehyde-o-(methylcarbonyl) oxime
90-12-0	1-Methylnaphthalene
70-25-7	N-Methyl-N'nitro-N-nitrosoguanidine
298-00-0	Methyl parathion
56-04-2	Methylthiouracil
91-20-3	Naphthalene
130-15-4	1,4-Naphthoquinone
134-32-7	1-Naphthylamine
91-59-8	2-Naphthylamine
86-88-4	1-Naphthyl-2-thiourea
7440-02-0	Nickel
13463-39-3	Nickel carbonyl
54-11-5	Nicotine
10102-43-9	Nitric oxide
98-95-3	Nitrobenzene
55-63-0	Nitroglycerine
100-01-6	p-Nitroaniline
100-02-7	4-Nitrophenol
79-46-9	2-Nitropropane
924-16-3	N-Nitrosodi-n-butylamine
1116-54-7	N-Nitrosodiethanolamine
55-18-5	N-Nitrosodiethylamine
62-75-9	N-Nitrosodimethylamine
759-73-9	N-Nitroso-N-ethylurea
10595-95-6	N-Nitrosomethylethylamine
684-93-5	N-Nitroso-N-methylurea
615-53-2	N-Nitroso-N-methylurethane
4549-40-0	N-Nitrosomethylvinylamine
59-89-2	N-Nitrosomorpholine
100-75-4	N-Nitrosopiperdine
930-55-2	Nitrosopyrrolidine
99-55-8	5-Nitro-o-toluidine
152-16-9	Octamethylpyrophosphoramide
145-73-3	7-Oxabicyclo[2,2,1]heptane-2,3-dicarboxylic acid
123-63-7	Paraldehyde
56-38-2	Parathion
608-93-5	Pentachlorobenzene
9999-00-1	1,2,3,7,8-Pentachlorodibenzo-p-dioxin
9999-00-4	Pentachlorodibenzofurans
76-01-7	Pentachloroethane
82-68-8	Pentachloronitrobenzene
87-86-5	Pentachlorophenol
504-60-9	1,3-Pentadiene
62-44-2	Phenacetin

85-01-8	Phenanthrene
108-95-2	Phenol
108-45-2	m-Phenylenediamine
95-54-5	o-Phenylenediamine
106-50-3	p-Phenylenediamine
62-38-4	Phenylmercury acetate
103-85-5	N-Phenylthiourea
75-44-5	Phosgene
7803-51-2	Phosphine
298-02-2	Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester
52-85-7	Phosphorothioic acid, O,O-dimethyl O-[p((dimethylamino)sulfonyl) phenyl] ester
88-99-3	Phthalic acid
85-44-9	Phthalic anhydride
109-06-8	2-Picoline
1336-36-3	Polychlorinated biphenyls
151-50-8	Potassium cyanide
506-61-6	Potassium silver cyanide
23950-58-5	Pronamide
1120-71-4	1,3-Propane sultone
107-10-8	n-Propylamine
107-19-7	2-Propyn-1-ol
129-00-0	Pyrene
110-86-1	Pyridine
504-24-5	Pyridine, 4-amino-
50-55-5	Reserpine
108-46-3	Resorcinol
81-07-2	Saccharin
94-59-7	Safrole
7782-49-2	Selenium
7488-56-4	Selenium sulfide
630-10-4	Selenourea
7440-22-4	Silver
143-33-9	Sodium cyanide
18883-66-4	Streptozotocin
57-24-9	Strychnine
95-94-3	1,2,4,5-Tetrachlorobenzene
30746-58-8	1,2,3,4-Tetrachlorodibenzo-p-dioxin
9999-00-3	1,2,3,7-Tetrachlorodibenzo-p-dioxin
33423-92-6	1,3,6,8-Tetrachlorodibenzo-p-dioxin
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran
630-20-6	1,1,1,2-Techloroethane
79-34-5	1,1,2,2-Tetrachloroethane
127-18-4	Tetrachloroethene
56-23-5	Tetrachloromethane
58-90-2	2,3,4,6-Tetrachlorophenol
78-00-2	Tetraethyl lead
107-49-3	Tetraethylpyrophosphate
109-99-9	Tetrahydrofuran
509-14-8	Tetranitromethane
7440-28-0	Thallium
10102-45-1	Thallium (I) nitrate
62-55-5	Thioacetamide
79-19-6	Thiosemicarbazide
62-56-6	Thiourea
137-26-8	Thiuram
108-88-3	Toluene
95-80-7	2,4-Toluenediamine
584-84-9	Toluene diisocyanate
636-21-5	o-Toluidine hydrochloride
8001-35-2	Toxaphene
75-25-2	Tribromomethane
120-82-1	1,2,4-Trichlorobenzene
71-55-6	1,1,1-Trichloroethane
79-00-5	1,1,2-Trichloroethane
79-01-6	Trichloroethene
9999-00-5	Trichloromonofluoroethane
75-69-4	Trichloromonofluoromethane
95-95-4	2,4,5-Trichlorophenol
88-06-2	2,4,6-Trichlorophenol
93-76-5	2,4,5-Trichlorophenoxyacetic acid
93-72-1	2,4,5-Trichlorophenoxy-propionic acid
7789-89-1	1,1,1-Trichloropropane
598-77-6	1,1,2-Trichloropropane

3175-23-3	1,2,2-Trichloropropane
96-18-4	1,2,3-Trichloropropane
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane
99-35-4	sym-Trinitrobenzene
52-24-4	Tris(1-aziridinyl) phosphine sulfide
126-72-7	Tris(2,3-dibromopropyl) phosphate
72-57-1	Trypan blue
66-75-1	Uracil mustard
1314-62-1	Vanadium pentoxide
75-01-4	Vinyl chloride
108-38-3	m-Xylene
95-47-6	o-Xylene
106-42-3	p-Xylene
1314-84-7	Zinc phosphide

APPENDIX E

STF 2.0 FILES AND ASSOCIATED INFORMATION

Page - 1 Soil Transport and Fate Database
Identification Information

ID Number:
STF Name / Common Names

Page - 1 Soil Transport and Fate Data Base
Chemical Characteristics

ID Number: Type:

STF Name:

Use or Occurrence:

Formula:

Short Reference:

Molecular Mass (g/mole):
MS Molecular Mass (g/mole):

Vapor Pressure (torr): E
E
E

Viscosity (g/cm-s): E
E
E

Specific Gravity:
Melting Point: (xC):
Boiling Point: (xC):

Short Reference:

Henry's Law Constant: E
(dimensionless) E

Diffusivity Coef., Air: E
(sp. cm/s) E
Diffusivity Coef., Water: E
(sp. cm/s) E

Gibb's Free Energy: E
(kcal/mole) E

Log Octanol-Water:

Page - 2 Soil Transport and Fate Data Base
Chemical Characteristics

		Short Reference:
Acid Dissociation Constant:	E	
(pka)	E	
Solubility in Water (mg/l):	E	
	E	

Detection Limit in Aqueous Medium:

EPA Guidance Concentration:

Air (ug/m^3)	Water (ug/l)	Soil (ug/g)
Medium:	Analytical Method:	Short Reference:

Short Reference and Comments Memo:

Page - 1 **Soil Transport and Fate Data Base**
Immobilization

ID Number: Type:

STF Name:

Soil Type and Conditions

Soil Name: Texture:

pH Range: - Average Temperature: (°C)

Average Moisture Content:

SOIL PROPERTIES

Permeability: (cm/d) Cation Exchange Capacity: (cmol/kg)

Organic Carbon (%): Saturated Water Content (fraction):

Saturated Hydraulic Conductivity: Porosity:

Bulk Density of Soil: (g/cm^3) Particle Effective Size: (mm)

WASTE PROPERTIES

Constituent Concentration (g/m^3):

Mass Fraction of Oil: Mass Fraction of Water:
Density of Oil (g/cm^3): Viscosity of Oil (cp):

log Ko: log Kh: log Kd:

Kf 1/n R^2 Kf 1/n R^2 Kf 1/n R^2

Low High Short References/Comments:
log Ko:
log Kh:
log Kd:

log Koc:
log Koa:
log Ksa:

Other Constituent Concentrations Memo

Comments Memo:

Page - 1 Soil Transport and Fate Data Base
Transformation/Degradation

ID Number: Type:

STF Name:

Soil Type and Conditions

Soil Name: Texture:

pH Range: - Average Temperature: (°C)

Average Moisture Content:

SOIL PROPERTIES

Permeability: (cm/d) Cation Exchange Capacity: (cmol/kg)

Organic Carbon (%): Saturated Water Content (fraction):

Saturated Hydraulic Conductivity: Porosity:

Bulk Density of Soil: (g/cm^3) Particle Effective Size: (mm)

WASTE PROPERTIES

Constituent Concentration (g/m^3):

Mass Fraction of Oil: Mass Fraction of Water:
Density of Oil (g/cm^3): Viscosity of Oil (cp):

Co (mg/kg) k (1/day) t 1/2 (days) R^2

Low High Short Reference/Comments:
k (1/day):

t 1/2 (days):

Other Constituent Concentrations Memo:

Experimental Description, Transformation Products and/or Short Reference and Comments Memo:

Page - 1 Soil Transport and Fate Data Base
Toxicity Data

ID Number: Type:

STF Name:

Carcinogenic Risk
Units: Short Reference/Comments:
Reference Dose:
Risk Specific Dose:

Toxicity Data Memo:

LC 50: (mg/l) Organism:
(mg/l)
(mg/l)

LD 50: (mg/kg) Route: Animal:
(mg/kg)
(mg/kg)

EC 50: Units: Organism:

Ames Salmonella typhimurium Assay:
Mutagenic Ratio: Mutagenic Dose:

Scale:

Short Reference and Comments Memo:

Page - 1 Soil Transport and Fate Data Base
Bioconcentration

ID Number: Type:

STF Name:

Short Reference:

Log Kow:

Log Bioconcentration:

Bioconcentration Data & Short Reference Memo

References Data

Id Number	Short Reference	Ref. Type

APPENDIX F

LIST OF JOURNALS, DOCUMENTS, AND REPORTS CITED

Acta Agronomica Acadamiae

Scientiarium Hungaricae

Advanced Drug Research

Agricultural and Food Chemistry

Annuals of Applied Biology

Applied and Environmental Microbiology

Aquatic Toxicology

Archives of Environmental Contamination Toxicology

Archives of Toxicology

ASTM Technical Publication #707

Biochemistry and Biophysics Research Communications

Biochemical Journal

Biodegradation and Bioaccumulation Test on Chemical Substances OECD Tokyo Meeting Reference Book TSU-No.3

Botanic Marina

Bulletin of the Japanese Society of Scientific Fisheries

Bulletin, Entomological Society of Egypt. Economic Series

Bulletin of Environmental Contamination and Toxicology

Bulletin of the National Institute of Hydrological Science

C. & S. Mar. Solvents Guide

Canadian Journal of Agricultural Science

Canadian Journal of Fisheries and Aquatic Sciences

Canadian Journal of Microbiology Cancer Research

Chemistry and Biology

Chemical Data Bases for the Multimedia Environmental Pollutant Assessment System (MEPAS)

Chemical Data for Predicting the Fate of Organic Compounds in Water, Volume 2

Chemical Engineers' Handbook, 5th ed.

Chemical Mutagens, Vol. 8

Chemical Review

Chemosphere

Choosing a Process for Chloride Removal

Contaminated Surface Soils in Place Treatment Techniques

CRC Critical Reviews in Environmental Control

CRC Critical Reviews in Microbiology

Cytobios

Development of Predictive Models for Xenobiotoc Bioaccumulation in Terrestrial Ecosystems

Developmental Toxicology and Environmental Science

Drinking Water and Health

Deutsche Gewasser Kundliche Miteilungen

Dynamic Exposure and Hazardous Assessment of Toxic Chemicals

Ecotoxicology and Environmental Safety

Elaboration of Sediment Normalization Theory for Nonpolar Hydrophobic Organic Chemicals

Environmental and Geological Water Science

Environmental Health Perspectives

Environmental Impact of Nonpoint Source Pollution

Environment International

Environmental Mutagenicity

Environmental Pollution

Environmental Progress

Environmental Science Services Corporation

Environmental Science and Technology

Environmental Toxicology and Chemistry

ERT--The Land Treatability of Creosote/ Pentachlorophenol Wastes

European Journal of Applied Microbiology and Biotechnology

Fate of Lindane in the Aquatic Environment

Fish Bulletin National Marine Fish Service

Food and Chemical Toxicology

Food Contaminants & Aqueous Wastes

Food and Cosmetics Toxicology

Foreign Compound Metabolism in Mammals

GE Material Safety Data Sheet #366

Geochimica et Cosmochimica Acta

Glassware Crops Research Institute Report

Groundwater Chemicals Desk Reference

Handbook of Acute Toxicity of Chemicals to Fish and Aquatic Invertebrates

Handbook of Chemical Property Estimation

Handbook of Chemistry and Physics, 1990, 70th ed.

Handbook of Chemistry and Physics, 1987, 70th ed.

Handbook of Environmental Data on Organic Chemicals, 2nd ed.

Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Vol. I

Hazardous Material Control Research Institute (HMCRI)

Hazardous Waste and Hazardous Materials

Hazardous Waste Land Treatment

Health and Ecological Assessment of Polynuclear Aromatic Hydrocarbons

Horticultural Science

Hydrologie

IARC Monographs

Indian Oil Seeds Journal

Industrial Hygiene and Toxicology, 3rd ed.

Industrial Effluent Standards for Toxic Pollutants: Proceedings 36th Industrial Waste Conference

International Priority Pollutants

Japanese Journal of Industrial Health

Journal of Biological Chemistry

Journal of Bulletin Philosophical Biochemical Society

Journal of Chromatography

Journal of Environmental Pathology and Toxicology

Journal of the Fisheries Research Board of Canada

Journal of General Microbiology

Journal of Investigative Dermatology

Journal of Physical Chemical Reference Data

Journal of Applied Ecology

Journal of Contaminant Hydrology

Journal of Economic Entomology

Journal of Environmental Quality

Journal of Environmental Science and Technology

Journal of Physical Chemistry

Journal of Science and the Total Environment

Journal of Soil Science

Journal of the Environmental Engineering Division--ASCE

Journal of the National Cancer Institute

Journal of the Science of Food and Agriculture

Journal of the Water Pollution Control Federation

Kirk-Othmer Encyclopedia of Chemical Technology, 3rd ed.

Log P Database

Manual of Treatment Processes

Marine Environmental Research

Marine Pollution Bulletin

Medchem Project Issue No. 26

Medchem Project Issue No. 19

Merck Index, 11th ed.

Merck Index, 10th ed.

Merck Index, 8th ed.

Metabolism of Pesticides

Mutation Research

Nature

NIH/EPA 1985 OHM/TADS

NIOSH RTECS online file

NIOSH RTECS 1981-82 Vols I-III

NRCC (National Research Council Canada)

Nuclear and Chemical Waste Management

NUREG/CR-089

Oak Ridge National Laboratory/ EIS-155/V1/1979

Oak Ridge National Laboratory/6451

Oceanic Atmosphere

OECD Tokyo Meeting Reference Book

Pesticide Manual, 6th ed.

Pesticide Science

Photochemistry and Photobiology

Phytopathology

Polycyclic Aromatic Hydrocarbons in the Aqueous Environment

Proceedings of the Royal Society of London, Ser. B

QSAR in Toxicology and Xenobiochemistry

Residue Reviews

Retention and Transformation of Pesticides and Phosphorus in Soil-Water Systems

Reviews of Environmental Contamination and Toxicology

Sango Igaku

Science

Science of the Total Environment

SERA Economic Biology

Soil Biology and Biochemistry

Soil Science Society of America Proceedings

Soil Science Society of America Journal

Solvents Guide

Substituent Constants for Correlation Analysis in Chemistry and Biology

Technical Bulletin/NTP

Textile Chemist and Colorist

Teratogenesis, Carcinogenesis, Mutagenesis

The Effect of Sediment Suspension on Adsorption and Fate of Kepone

The Land Treatability of Appendix VII Constituents Present in Petroleum Refinery Wastes

The Journal of Chemical and Engineering Data

The Pesticide Book

The Soil Chemistry of Hazardous Materials

Toxicity Assessment

Toxicological Epidemiological Mechanisms Toxicology

Toxicology Letter

USAF--The Installation Restoration Program Toxicology Guide, Volumes 2 and 3

USEPA CR-811498010

USEPA/ECAO--Health and Environmental Effects Profile, Cresols
ECAO-CIN-P138

USEPA SW 846--Test Methods for Evaluating Solid Waste

USEPA SW 874--Hazardous Waste Land Treatment

USEPA 440/4-79-029b

USEPA 530/SW-89-031

USEPA 540/2-84-003b

USEPA 560/2-76-010

USEPA 560/5-77-005

USEPA 560/11-80-006

USEPA 600/3-80-041

USEPA 600/3-82-060

USEPA 600/4-82-057

USEPA 600/6-84-009

USEPA 600/6-84-011

USEPA 600/6-86-003a

USEPA 600/6-86-003b

USEPA 600/6-88-001

USEPA 600/7-78-074

USEPA 600/9-79-012

USEPA 68-01-6030

USEPA Report NTIS PB278-269

USEPA HEAST--Health Effects Assessment Summary Tables

USEPA--Potential Terrestrial Impacts of Contaminated Soil

Waste Management and Research

Water, Air, and Soil Pollution

Water Research

Water Resources

Zeitschrift fur Wasser-und Abwasser Forschung